# ABSTRACT

Strength characteristics of masonry, in the Indian Context, has received scant attention by researchers The present thesis is concerned with the strength of brick masonry using the locally produced table moulded bricks in Bangaloré As a special application, the nature of stresses around openings in masonry and the strength of masonry with openings has been examined

Chapter one summarises the historical development in brick masonry and the studies on the structural behaviour of masonry The inadequacy of the Indian research on masonry using local masonry materials is highlighted The scant information on strength of walls with openings is also brought out

In chapter two, various strength and elasticity parameters of brick masonry constituents are studied The water absorption, compressive and tensile strengths, modulus of elasticity, Poisson's ratio and the value of ultimate strain are measured for a sample of table moulded bricks produced at Bangalore, India Two types of masonry mortars have been examined, the cement-sand mortar with mix proportions 1 6, and the cement-lime-sand mortar with mix proportions 1 1 6 The compressive and tensile strengths, modulus of elasticity, Poisson's ratio and the values of ultimate strain have been determined for the two mortars The studies bring out the surprising result that the mortars in Indian masonry are stiffer than the bricks

In chapter three, the behaviour of brick masonry has been studied through tests on two types of masonry prisms, (i) masonry prisms loaded normal to bed joints, and (ii) masonry prisms loaded parallel to bed joints The two prism types have been studied for both the mortars The compressive and direct tensile strengths, modulus of elasticity,

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Poisson's ratio and the values of ultimate strains have been measured for the two types of masonry prisms and the masonry efficiency has also been determined The test results indicate the development of lateral tension in mortar joints when the prism is loaded in compression normal to bed joints

Chapter four deals with the finite element analysis of the two prism types A linear-elastic analysis is performed for this purpose Both the prism types are subjected to uniformly distributed loads and each of them has been studied for different ratios between Young's modulii and Poisson's ratios of mortar and bricks The effect of the thickness of mortar bed joints has also been examined The analysis reveals the interesting fact that the vertical mortar joints are highly stressed since they have higher elastic modulus than the bricks

In chapter five, the experimental study has been extended to complete masonry walls Six walls have been tested including one solid wall, four walls with openings without lintels, and one wall with opening with a reinforced concrete lintel All walls have been subjected to uniformly distributed loads through a stair-case loading system Strain measurements have been taken at different points on the body of walls The cracking loads, cracking patterns, and the load carrying capacity have been recorded for all walls

In chapter six, a finite element analysis has been performed for 41 walls, of different sizes and different sizes of openings with and without lintels All walls are subjected to uniformly distributed loading The stress distribution within the bodies of these walls have been studied for different ratios between Young's modulii of bricks and mortar The effect of thickness of the mortar bed joints has also been studied for the solid walls The stress concentration factor which gives an indication of the concentration of vertical stresses at the corners of openings is examined This stress concentration factor has been studied for different sizes of openings with and without lintels for different mortars

The thesis ends with a short chapter summarising the major findings It also includes suggestions for further research